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MEDICAL NEWS LETTER

Vol. 38 Friday, 1 December 1961 No. 11

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FROSTBITE: EXPERIENCE WITH RAPID REWARMING AND ULTRASONIC THERAPY (continued)

William J. Mills Jr, Robert Whaley, and Winthrop Fish, Anchorage, Alaska. ALASKA MEDICINE, Part II, * Vol. 2, No. 4, December 1960.

Variation of Result by Method of Treatment

The treatment of frostbite as advanced by the authors in Part I of this paper consisted of the rapid restitution of body temperature by warm oral liquid intake and a warm total bath when possible. This was followed immediately or concurrently by the rapid rewarming of the affected part by submersion in a water bath, 110 to 118 degrees Fahrenheit, preferably in a whirlpool. Treatment thereafter utilized whirlpool baths containing pHisohex^{R} solution once or twice daily at body temperature. In some cases, the use of ultrasound was combined with the whirlpool bath.

Initially, antibiotics were utilized for the first 2 weeks of therapy. The choice of antibiotic varied. The particular choice had been that of a combination of streptomycin and penicillin. In recent cases, no antibiotics have been used in the treatment of these patients unless the presence of infection was identified.

All attendants, particularly in the early stages, were required to wear clean gowns and face masks. In cases of this series, the treatment of the injury was by the open method without the use of occlusive dressings or ointments. It was found that some time after the fourteenth through the twenty-fourth day, with much variation in this time, sufficient drying of the tissues occurred so that clean sheets or drapes might be substituted for the sterile cover.

Table VIII
Results by Type Hospital Treatment
Authors' Method vs All Other

	A	B	C	D	Total
Full F.B.R. Program (R.R., U.S., W.P., P.T.)	0	6	1	0	7
U.S., W.P. & P.T.	1	4	2	1*	8
W.P. & P.T.	1	4	1	0	6
Total above	2	14	4	1	21
Other methods	2	12	8	8	30

* See text

The investigators had little control of early treatment in most of the subjects available for study. Patients are categorized by the type of treatment which they received.

Seven patients received the full treatment as outlined. Six of these could later be classified in Group B and one in Group C. The second group noted consisted of eight patients who were allowed to warm by being placed in a warm room, but who were seen soon after and received whirlpool, ultrasound, and physical therapy. This resulted in one Group A, four Group B, two Group C, and one Group D.

Six patients received neither rapid rewarming nor ultrasound, but did receive the essentials of the program which consisted of open treatment with daily whirlpool and physical therapy; this resulted in one Group A, four Group B, and one Group C. The totals of these three groups are tabulated and compare in number with the total patients treated by other methods (thirty in number) wherein there was much greater anatomical loss. Of these, a greater percentage fell in Groups C and D; this is a statistically significant difference.

The initial treatment of this series of patients varied widely depending upon where and by whom they were first seen. Of the total of fifty-one subjects, only seven were treated by "rapid rewarming." In many cases, of course, the extremity had thawed and risen to near body temperature by the time the patient reached trained medical aid. This occurred either during the period of rescue, transportation, or while awaiting examination or treatment in a warm room. One case * thawed his own feet by exposing them to dry heat from a diesel generator exhaust. This case resulted in bilateral amputation of the tarsal-metatarsal junction. The tissue temperature is apparently readily raised to a lethal level when the injured tissue is not being perfused with blood.

Six subjects were treated by immersing the foot in snow or ice water to achieve slow thawing (Table IX) in accordance with principles widely advocated in the past and by some authorities today. It is important to note that, though this is a small series, half of these patients sustained major amputation. They fell in Group D; two-thirds, or four, sustained some anatomical loss. By comparison, of the patients treated by "rapid rewarming," or of

Table IX
Result by Method of Initial Treatment

	A	B	C	D
Rapid rewarming (water bath 110 - 120° F)	0	6	1	0
"Thawing" with ice, snow, or ice water	1	1	1	3
Other means, predominantly room temperature	3	19	10	5
Excessive dry heat	0	0	0	1

those allowed to thaw at room temperature, fewer than 10% sustained major amputation and only approximately one-third demonstrated any tissue loss. Despite the small number of cases, this is in accordance with the general findings in animal experimentation. Although the proportion of those sustaining no anatomical loss in the group with "rapid rewarming" is considerably greater than that among those thawed at room temperature, the differences are not statistically significant in this small series.

Patients not treated directly by the authors received a variety of treatment. This included whirlpool and physical therapy in some cases, while others were treated with occlusive dressings, and a few with either anticoagulants, vasodilators, or sympathetic block. None of the last were used on a sufficient number of patients to warrant statistical consideration.

Table X
Result by Whether Closed or Open Treatment
Was Used—All Cases

	A	B	C	D
Open method (no cover)	2	17	4	2
Closed method (occlusive dressing)	2	9	8	7

Two major categories of treatment consisted of the "Open" as opposed to the "Closed" method. The "Open" method is defined as treatment using absolutely no cover or dressing of any kind. The "Closed" method is descriptive of the utilization of occlusive dressings, with or without ointments or salves, moist dressings, or incorporation of the part in plaster of Paris. Twenty-five patients were treated with the "Open" method; of these, six sustained anatomical loss (Table X). In this group were two major amputations. On the other hand, twenty-six patients were treated by "Closed" methods, and of these, fifteen had sustained anatomical loss with seven major amputations. The cause for this difference, which appears significant, is discussed, but a portion of the difference appears to be in the dissimilar incidence of infections utilizing the two methods.

Table XI
Days Hospitalized by Method Treatment

Days Hospitalized	Open	Closed
0 - 10	3	5
11 - 30	4	0
31 - 60	8	6
61 - 120	7	5
121 - or more	3	10

Deep cellulitis appeared more frequent in the Closed method of treatment. This difference is reflected in the somewhat longer hospitalization of the severely injured patient (Table XI, page 7).

Table XII
Result by Presence or Absence of Infection, and Severity

	A	B	C	D
Without infection	3	18	1	2
With infection	1	8	11	7

Important to the final result as evidenced by this series of patients was the presence or absence of infection (Table XII). For this separation, infection was considered to consist of any demonstrable evidence of purulent material regardless of amount and, in most cases, was demonstrated by bacteriologic culture.

Table XIII
Result of Use of Debridement

	A	B	C	D
Without debridement	3	20	0	3
With debridement	1	6	12	6

In Table XIII the subjects are tabulated without regard to other features of their treatment, initial or late, to demonstrate the relationship of debridement to result. The distribution is seen to correspond closely to the previous table, Table XII. Debridement was considered to mean intervention surgically, by isolated or periodic removal of superficial tissues with any instrument, but not amputation. Rupture of the blebs mechanically was considered debridement. In order to determine the features responsible for this apparent relationship, the subjects were again reclassified (Table XIV). This classification was arranged to distinguish between those in which debridement was performed because of severe infection and those in which infection was not prominent at the time of debridement but followed the procedure. The authors believe that this tabulation is important.

It will be seen that good results generally were obtained in those patients who (1) were neither infected nor debrided, (2) were infected but not debrided, (3) were debrided but not infected. On the other hand, poor results were obtained in those patients who were infected and debrided, or in a fairly large group of patients who were debrided and developed infection following debridement. It should be noted that of twenty-six patients of all types not treated by debridement, only three sustained significant tissue loss. Of seventeen individuals not infected at the time of debridement, fourteen, or all but

three, suffered significant tissue loss and five sustained major amputation. The authors consider it overwhelmingly demonstrated here that of all the factors in the treatment of frostbite which may influence the result, premature surgical intervention by any means, in any amount, is by far the greatest contributor to a poor result of any variable analyzed.

Table XIV
Debridement and Infection vs Result

	A	B	C	D
Not debrided and not infected	3	16	0	2
Not debrided and infected	0	4	0	1
Debrided and not infected	0	2	2	0
Debrided and infected prior to debridement	1	3	2	1
Debrided, without prior infection and infected subsequent to debridement	0	1	8	5

An attempt was made to evaluate the method utilized by the authors in regard to the number of infections sustained during the course of treatment. For this purpose, the series was divided into three categories, to include those treated by the authors' methods, those treated by other methods, but utilizing whirlpool bath, and those utilizing any treatment excluding whirlpool.

Initially, the patients were classified as demonstrating the absence or presence of infection. When so presented, this series of subjects showed almost 50% infection regardless of treatment. However, when reclassified into superficial or deep, a marked difference appeared. This classification was not an arbitrary one since those classified as superficial consisted of small infected pockets or pustule formation in the eschar or tissues adjoining it.

Table XV
Infection by Method of Treatment

	No Clinical Infection	Superficial Infection	Deep Infection incl. Osteomyelitis
F.B.R. Program	11	10	0
Other methods with whirlpool	3	5	0
Other methods without whirlpool	10	3	9

Deep infections, however, invariably consisted of extensive cellulitis, with or without osteomyelitis. No patients were seen who fell between these extremes.

Results of this distribution are shown in Table XV (page 9). It will be seen that, although both the program recommended herein and other methods which included whirlpool had a significant number of infections, these were entirely superficial. Other methods, however, without the use of whirlpool therapy developed infection that quite often progressed to become deep, and usually resulted in serious tissue loss. The authors' clinical impression has been that daily whirlpool therapy with antiseptic cleansing solution is an effective method to prevent the development of a serious infection, and that this is confirmed by these results.

Table XVI
Original Estimate of Injury vs Result

	Result	
	Superficial	Deep
Original estimate		
superficial	21	17
deep	4	9

Table XVI represents the subjects of this article classified according to the original estimate of degree of injury, superficial or deep, plotted against the final estimate as measured by tissue loss. Superficial injury was defined as limited to skin, corresponding to "first" and "second" degree injury of many writers. Deep injury involves tissues below the skin including muscle, tendons, nerves, blood vessels, and bone. This is comparable to "third" and "fourth" degree injury. It is apparent from a glance at the figures that there is little correlation between the initial estimate of injury and the final result.

Most of the original estimates of the degree of injury were made by one of the authors (WM) who had considerable experience with frostbite. It is apparent that the judgment of the severity of injury soon after its occurrence is extremely difficult—if not impossible. The further classification of frostbite, particularly in the initial stages, into "degrees" such as has been attempted by many authors, must necessarily be tentative and unreliable. Further, it has no clinical usefulness apparent to the writers. No data had been accumulated which would indicate a variety of treatment methods dependent upon the diagnosis of depth of frostbite.

In Table XVII, the salient features of those patients falling in Group "D" are summarized. It is interesting that five of the patients had debridement followed by infection; of this group, one patient sustained bilateral major amputation prior to the fourteenth day. His course subsequently was followed by soft tissue infection at the amputation site and osteomyelitis of the distal portion of the amputation stump. He required revision of both amputation sites due to persistent infection.

Two patients, involved in an airplane accident, sustained such injury that amputation was performed in the absence of debridement or infection.

In one, the vascular trauma was so great that all pedal pulses in the foot were absent and examination upon initial admission demonstrated a fracture dislocation of the ankle and the navicular, the latter remaining unreduced. As a life-saving measure and in order to obtain help for his companion, he had crawled with the above noted injury over 8 hours, at least three and one-half miles down a mountain side in sub zero weather in the Arctic. It is logical to assume that he sustained considerable vascular injury during this travel. His injuries included a fracture of the lumbar spine as well. In this particular case, spontaneous separation of the tissues occurred at the tarsal-metatarsal junction.

TABLE XVII

Features of Those Cases with Major Amputations

Case	Area	Age	Race	Assoc. Injury or Condition	Factors Preceding Amputation	Level of Amputation
10	Fr-l	17	E		Severe penetrating deep cold injury. Early demarcation, dry gangrene, left distal foot. Debridement followed by infection and retraction of tissues.	Trans-metatarsal left foot
18	Fl	41	E	Fx lumbar spine Fx-dislocation left ankle Dislocation left navicular	Vascular trauma incident to crawling on hands and feet 3-4 miles, 8 hrs. dragging L leg. Unreduced navicular dislocation.	Middle third left tibia. (Preceded by spontaneous separation tarsal-metatarsal junction)
22	Hr, Fr	36	E	Fx Metacarpal R hand Fx tibia (closed) R Fx talus, R	Cold injury superimposed upon multiple fx's, R lower leg. Vascular deficit.	Mid third right tibia.
23	Fr-l, Hr	54	E	Starvation Dehydration	Deep penetrating cold injury. Thawing with ice and snow water.	Bilateral metatarsal phalangeal junction (level of demarcation)
31	Fr-l	42	C	Alcoholic stupor	Debridement, infection, early amputation prior to 14th day, osteomyelitis	1) Proximal 3rd left tibia 2) Tarsal-metatarsal junction right
33	Fr-l	42	C	Alcoholic stupor	Multiple episodes "frostbite", cold exposure after alcoholic bout. Superficial infection, debridement, osteomyelitis and multiple phalangeal amputations	Complete bilateral phalangeal loss, all toes, L&R
38	Hr-l	69	C	Alcoholism Organic brain syndrome	Thawing, ice packs, early debridement, infection.	Phalangeal amputations bilateral, excluding thumbs.
46	Fr-l	46	C	Alcoholic stupor	Early debridement, early surgical procedures (grafts) infection, osteomyelitis	Bilateral proximal third tibial amputations
49	Fr-l	28	C		Severe penetrating cold injury. Thawed at excessive dry heat 165-185° F. Rapid deep demarcation, tarsal-met. junction.	Bilateral tarsal-metatar-junction

Amputation was performed at the mid-tibial level on another patient with such skeletal injury of tibia and talus, including interarticular injury, to preclude (in the opinion of the surgeon caring for him) a good terminal result. One other patient whose extremities were thawed with ice and snow water received such deep penetrating cold injury and was without treatment for such a length of time that spontaneous demarcation occurred. His loss was bilateral at the

metatarsal-phalangeal junction. Another patient, with thawing by ice packs, had an unfortunate result involving both hands with associated early debridement and infection.

Rapid demarcation with the bilateral loss at the mid-foot appeared in the patient (previously referred to) who had thawed his feet in a diesel generator exhaust. With the open method of treatment and constant whirlpool therapy, no evidence of deep infection developed despite the excessive warming that he initially sustained. After multiple skin grafts he obtained a good functional result and required no further amputation.

Ultrasound

The authors have been interested in the utilization of ultrasound as a penetrating tool and an adjunct therapy in the treatment of frostbite. It has been used in these cases only in conjunction with whirlpool. The results of ultrasound at this time are inconclusive. Only recently have they attempted its controlled unilateral use in cases with bilateral symmetrical injury of hands and feet. An insufficient number of such control cases have been accumulated to draw valid conclusions (Table VIII). In this table, eight patients received therapy utilizing ultrasound, whirlpool, and physiotherapy without "rapid rewarming."

Six others were treated similarly, excluding the use of ultrasound. No marked difference was seen.

* These studies were aided by Contract Nonr-3183 (00) (NR 105-249) between the Office of Naval Research, Department of the Navy, and William J. Mills Jr, M. D.

(Part III of this series of articles on Frostbite will continue in the next Medical News Letter.)

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Neurological Sequelae of Spinal Anesthesia

Nicholas M. Greene MD, Professor of Anesthesiology, Yale University School of Medicine, New Haven, Conn. Anesthesiology 22: 682-698, September - October 1961.

Spinal anesthesia, first performed by Corning in 1885 and introduced clinically by Bier in 1899, has been the subject of controversy ever since. This controversy—often more emotional than objective—has centered around permanent neurologic deficits associated with the technic. The first of these was reported in 1906; since that time, innumerable reports of single cases or series of cases of neurologic impairment have appeared. This has led some to condemn the technic, a position vehemently attacked by others who believe the technic to be without complications. A few take the middle road and attempt to show

that both extremes have some validity and the truth lies in between. Enough work has been done on spinal anesthesia so that it is now possible to evaluate the question of neurologic damage with objectivity.

Because treatment of neurologic complications due to spinal anesthesia is so unsuccessful once they have developed, prevention becomes the main and best approach to the problem. The successes reported in decreasing the incidence of neurologic sequelae to the vanishing point testify to the efficacy of prevention in managing the problem.

The first consideration in prevention concerns the histotoxic properties of local anesthetic agents employed. Procaine and tetracaine are conspicuously devoid of histotoxicity in the subarachnoid space, and have been and are widely regarded as safe anesthetics. Clinical experience over many years in hundreds of thousands of cases confirms their value and safety in spinal anesthesia. The same is not necessarily true for the many other local anesthetics available for spinal anesthesia. None of them has had histotoxic properties in the subarachnoid space as fully documented clinically and experimentally. Neither has any been used in statistically large enough series of cases (with adequate follow-ups) to indicate whether under clinical conditions they are as devoid of neurologic complications as are procaine and tetracaine. Certain of them may eventually prove to be as safe as procaine or tetracaine, but before using them the anesthetist should bear in mind that an increased toxicity may become apparent only after many thousands of cases and after many years of use. The literature of the last 60 years lists over 30 local anesthetics which have been used for spinal anesthesia before being abandoned after it gradually became apparent that they had inherent neurotoxic qualities. Because two proven agents are available, and because no other local anesthetic has demonstrable advantages over these two in spinal anesthesia, prevention of neurologic sequelae must include avoidance of indiscriminate use of new and different local anesthetics merely because they are new and different and produce anesthesia.

Histotoxicity being a function of concentration, prevention of neurologic complications also includes strict limitation of the concentration of local anesthetic employed. Procaine should not be used in concentrations greater than 5%, tetracaine in concentrations greater than 0.5%. Dosage being one determinant of the concentration to which subarachnoid structures are exposed during spinal anesthesia, it probably also should be limited, although dosage is usually limited to avoid excessive spread of the anesthetic. Single intrathecal injections should not exceed 200 mg for procaine or 18 mg for tetracaine.

Prevention of neurologic sequelae includes strict asepsis. This involves shaving the patient's back, preoperative washing of the back with soap and water the night before, and use of appropriate bactericidal solutions on the patient's back immediately prior to lumbar puncture. It also includes use of sterile drapes at the time of lumbar puncture as well as a mandatory surgical scrub by the anesthesiologist prior to putting on sterile surgical gloves for the lumbar puncture. Spinal sets and ampules must be sterilized by autoclaving: 255-260 F under 18-20 pounds pressure for 30 minutes has proven adequate. Sterilizing of ampules must not be achieved by soaking in germicidal

solutions. The use of ethylene oxide for sterilizing spinal equipment should be avoided until experimentally proven safe. Use of an introducer may be wise to prevent not only bacterial contamination of the spinal needle as it passes through skin which cannot be rendered completely sterile, but also to prevent chemical contamination of the needle by sterilizing solutions remaining on the skin.

Chemical contamination must be avoided by use of glass syringes, by preventing the solution used to clean the skin from dropping on the anesthetic equipment, by autoclaving drugs, and by meticulous cleaning of spinal syringes and needles prior to their being autoclaved. Such cleaning should rely upon scrubbing with soap and water, followed by copious rinsings with ether and distilled water. Detergents, germicides, and chemicals used to dissolve blood clots should not be used in cleaning spinal sets. Spinal sets should be wrapped in lint-free coverings. Finally, starch or talcum used on gloves must be prevented from contaminating spinal sets by putting on such gloves some distance away from the set and, preferably, by rinsing the outside of the gloves with sterilized saline.

Trauma must be avoided by proper positioning of the patient, a thorough knowledge of the anatomy involved, and gentle but firm motions rather than abrupt plunges when inserting the spinal needle.

Prevention of neurologic complications by avoidance of spinal anesthesia in patients with preexisting diseases of the central nervous system has been advocated, but despite widespread acceptance of the principle involved, proof of the validity of the principle is lacking. If preexisting spinal cord disease predisposed to neurologic complications of spinal anesthesia, one would expect to find an increased incidence in the older age groups because of spinal cord changes associated with the aging process. There is, however, no relationship between age and incidence of postspinal sequelae. Certainly, there is no reason to avoid spinal anesthesia in diseases involving only the cranial portions of the central nervous system, provided they are not associated with increased intracranial pressures. Elderly patients with cerebral arteriosclerosis or parkinsonism, for example, often do better with low spinal anesthesia for perineal or lower extremity surgical procedure than they do with general anesthesia if the blood pressure is maintained. But in patients with diseases involving the spinal portion of the central nervous system, administration of spinal anesthesia should be avoided despite the lack of proof that it will make the condition worse. This should be done if for no other reason than so many of these disorders are progressive or subject to spontaneous exacerbations.

The tendency has been, and undoubtedly always will be, to blame spinal anesthesia for such progression or accentuation even though the same neurologic changes might have occurred in the absence of spinal anesthesia. Spinal anesthesia should not be administered in symptomatic conditions involving the cord or in conditions where spinal cord involvement is known to occur, but where symptoms of such involvement are not yet present. The latter category includes patients with pernicious anemia, patients with asymptomatic positive spinal fluid serology, and patients with tertiary syphilis and undetermined

spinal fluid serology. Common sense and medicolegal considerations may denounce spinal anesthesia in situations where the cord is uninvolved, but where spinal nerve roots are involved. Such situations include patients with metastatic carcinoma to the spinal column or a herniated nucleus pulposus. In paraplegics where the spinal cord is so damaged as to be functionless, spinal anesthesia may be employed on the basis that no further damage can result.

Medicolegal Considerations

Anglo-Saxon legal tradition is based on the concept that a person is assumed to be innocent until proven guilty. Medicolegally, this tradition is carried out on the principle that a plaintiff instituting suit for malpractice against a physician must prove negligence. Unless such negligence can be legally proven, malpractice cannot be established. There are situations, however, in which events have taken place which are, in themselves, so obviously the result of negligence that expert medical testimony is not required to prove negligence, a lay jury being capable of establishing this on the basis of facts alone. An example of this is the sponge or instrument remaining in the peritoneal cavity following laparotomy. The legal term used in such situations is res ipsa loquitur, literally, "the thing speaks for itself." The doctrine of res ipsa loquitur has been applied to neurologic complications following spinal anesthesia. The fact that a patient has had a spinal anesthesia and has developed a neurologic deficit does not, however, in itself prove that the deficit is due to the anesthesia, nor does it prove negligence in administration of the anesthetic.

The application of the doctrine of res ipsa loquitur removes, however, the necessity for such proof and says, in effect, that any physician administering a spinal anesthetic places himself in a special Alice in Wonderland legal world where proof is no longer of any consequence. The doctrine of res ipsa loquitur in such cases becomes a travesty of justice. The anesthetist, according to this doctrine, is responsible for neuropathies due to the surgical procedure, for thrombosis of the anterior spinal artery, for spinal cord meningiomas, for the onset of multiple sclerosis, and for anything and everything that neurologically befalls the patient. The illogic of res ipsa loquitur is demonstrated by the fact that neurologic damage identical to that seen after spinal anesthesia may also be seen after general anesthesia, and by the fact that when properly evaluated, very few postspinal neurologic complaints are found to be due to the anesthesia. The tendency of insurance companies to follow such post hoc ergo propter hoc reasoning compounds the problem and further restricts the physician in practicing medicine on the basis of purely medically acceptable facts.

To prove that neurologic damage is due to spinal anesthesia, it must first be proven that the causative lesion is intradural in location. Also, it must be proven that temporally it is at least possible that the onset of symptoms coincided with administration of the anesthesia and that such symptoms did not antedate the anesthesia. It must be proven that the intradural pathologic change is histologically a type which can be associated with spinal anesthesia; and,

finally, that this change is actually due to the anesthesia. Even in cases of chronic adhesive arachnoiditis following spinal anesthesia, such proof is difficult to obtain because chronic adhesive arachnoiditis can develop without any relationship to spinal anesthesia.

Even if all the foregoing conditions can be proven, there still remains the necessity for proving negligence on the part of the anesthetist before malpractice can be established. Unless some break in technic can be proven which results in the introduction of one of the etiologic factors discussed in the author's paper, proof of negligence cannot exist even though a lesion such as arachnoiditis may have developed. Abandoning the doctrine of res ipsa loquitur will allow such proof to be obtained in a limited number of cases and thereby will contribute to the quality of medical care by removing the stigma attached to an otherwise valuable form of anesthesia.

NOTE: It is strongly recommended that interested readers refer to the original of this excellent and comprehensive article by Dr. Nicholas M. Greene. He discusses the neurologic sequelae of spinal anesthesia from the standpoint of classification, incidence, pathology, etiology, diagnosis, treatment, prevention, cranial nerves, and medical considerations. The digest contains the very important and practical remarks of the author concerning prevention of neurologic sequelae and the medicolegal considerations involved.

—Editor

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MISCELLANY

The Armed Services Medical Regulating Office

By CDR Robert G. Luckie MSC USN, Chief, Armed Services Medical Regulating Office, Washington 25, D. C.

Since the inception of the Korean Conflict and into the present jet age, aircraft have been recognized as a primary means of evacuating military patients. This transition from surface to air opened new horizons to our military medical planners bringing about a long awaited evolution in the evacuation process. Indeed, distance and terrain, which for several centuries harassed the military in their efforts to expedite the movement of sick and wounded, have been reduced to something less than a primary consideration in the transfer of patients. Time and direction, however, remained paramount and emphasized more than ever a requirement for the utmost dispatch in regulating patients to specialized hospitals for treatment. With the boundaries of the United States

steadily shrinking at a rate commensurate with the attainment of greater speeds, a shift in emphasis from decentralized to a single central control for the efficient and economical regulating of patients of the three services, Army, Navy, and Air Force, was indicated.

The Department of Defense took cognizance of the situation in 1950 and directed that a single office to be known as the Armed Services Medical Regulating Office (ASMRO) be established and have vested in it full authority and responsibility for regulating patients and utilizing hospital bed credits of the three services within the continental United States (CONUS). Therefore, it was decided to make ASMRO operational under the Executive Agent concept of the Joint Chiefs of Staff with the Army Chief of Staff as Executive Agent. In turn, the Chief of Staff designated the Surgeon General, U.S. Army, as his Executive Representative for administration and housekeeping functions. Accordingly, the ASMRO Charter was issued by the Secretary of Defense on 25 October 1950 and reissued as DOD Directive No. 5154.6 in February 1953. Thus, the Armed Services Medical Regulating Office was established.

What is ASMRO? What does ASMRO do? What part does ASMRO play in the specialized treatment program of the uniformed services? These are questions heard quite frequently from medical and nonmedical personnel of the Military Departments.

ASMRO is a joint agency of the Army, Navy, and Air Force, conceived as a wartime agency, but since proven to be a vital element for the peacetime control of military medical regulating within the United States. It also assures the sustained operation of a nucleus to provide a base for rapid expansion in the event of mass casualty situations. Three Medical Service Corps officers, one from each of the three services, are assigned to ASMRO. Each serves as medical service representative of his respective Surgeon General. One of these representatives is designated Chief of ASMRO and the other two are designated Deputy Chiefs; one for Operations and the other for Administration. As individuals, the representatives are responsible for carrying out the hospitalization and evacuation policies of their respective Surgeons General. As a group, they are responsible for the efficient operation of the office in accordance with instructions issued by the Secretary of Defense under the ASMRO Charter.

Today, the primary mission of ASMRO is to regulate the flow of uniformed services patients arriving in CONUS from overseas to and between specialized service hospitals within the CONUS which best serve the interest of the patient and the military establishment. Additionally, ASMRO obtains Veterans Administration hospital designations for active duty members of the three military services who are being retired for disability and who require further hospitalization. It also provides bed designations in Public Health Service hospitals for personnel of that service who are being returned from oversea areas for hospitalization. Similarly, in the case of military dependents and other civilians being returned from overseas via military medical channels, ASMRO provides the necessary bed designations within the CONUS. To accomplish such a mission implies a task of considerable magnitude and

one which requires an intimate knowledge of the specialized treatment programs of the three services as well as a profound working relationship with transportation agencies on matters relating to the movement of sick and wounded. (In the latter instance, it should be noted that while air is considered the primary method of patient movement, other modes of transportation are still authorized when considered more advantageous.)

Because military preparedness involves worldwide dispersal of our forces and because the limited number of medical specialists available to the military precludes a similar dispersal of specialized medical treatment facilities, it has been necessary to concentrate professional potential at strategic locations and move patients to the specialists. Therefore, ASMRO can and does effect the timely regulation of thousands of patients throughout the world each year into the comparatively few areas within the CONUS where specialty centers are located.

Many complexities attend the operation of an effective medical regulating agency. However, the genesis of sound medical regulating establishes only three major considerations which still prevail and are recognized by ASMRO as paramount. First, ASMRO must consider the type of injury or disease involved and the medical specialty requirement. Next, the selection of a hospital, Army, Navy, Air Force, or Public Health, which has the specialty capability and bed space. Selection of the appropriate treatment facility embraces a myriad of details which must be satisfied to insure that only the highest standard of medical professional care is accorded and that the psychologic well-being of the patient is maintained. Finally, ASMRO must, from the standpoint of travel time, anticipate the mode of transportation most likely to be used and the routes over which the patient will travel to the destination hospital. Each of these factors multiplied by the thousands of patients regulated annually will give some idea of the tasks to which ASMRO devotes itself.

In order for ASMRO to effect the timely movement of large numbers of patients and, at the same time, consider the individual needs of each patient, it was necessary to develop a system of reporting which would be comprehensive in substance yet sufficiently succinct in print to permit transmission by electrical means. Tantamount to such a challenge is the system of medical coding developed by ASMRO and utilized throughout the Armed Forces today. In brief, the coding system entails the use of letter and numeral series which when arranged in the proper sequence provide ASMRO with full particulars on each patient awaiting a hospital designation.

A properly coded message reflecting a combined total of no more than twelve letters and/or numerals will serve to identify for ASMRO the patient's departmental status, sex, rank or grade, medical classification (litter or ambulatory), diagnosis, and specialty requirement. Suffixing the code with an abbreviation for the patient's duty station will indicate further that hospitalization is anticipated to be of short duration and assignment to a specialized treatment facility in the immediate area is preferred. In cases where prolonged periods of hospitalization can be anticipated, the abbreviation for the patient's home of record (city and state) is substituted for the duty station,

whereupon ASMRO will endeavor to designate a specialized treatment facility nearest his home. The purpose of the latter measure is to enhance the psychologic well-being of the patient as well as that of his family. The system of coding is particularly effective when reporting groups of patients. It enables the agency reporting to identify any number of patients on a single message with minimal expenditure of administrative effort and time and, more important, without compromise as to detailed information so essential in determining the most appropriate specialized treatment facility for the patient.

Significant is the fact that with medical coding ASMRO is now prepared to cope with regulating large numbers of patients, such as those handled in the Korean Conflict. In the event of a sharp increase in casualties the present system would of necessity undergo immediate and rapid expansion to allow for mass movements of patients. To this end ASMRO is constantly engaged in seeking refinement of methods currently employed in all phases of medical regulating, and incorporating pertinent findings in their advanced planning.

Because ASMRO is a joint agency, the success of its mission is in the greatest measure dependent upon complete coordination and cooperation from each of the services represented. Consequently, vital statistics from each service regarding their medical specialty programs and status of bed credits continually flow into the Armed Services Medical Regulating Office. Close liaison is maintained at all times with the various transport agencies for the purpose of keeping ASMRO fully informed of changing routes, schedules, and frequencies. By funneling these data into a single focal point the combined facilities and professional capabilities of the Army, Navy, Air Force, and Public Health Service can be utilized to the maximum in obtaining definitive professional care and treatment for our military sick and wounded. Consequently, medical armamentarium has been substantially expanded and patient care potential greatly enhanced.

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From the Note Book

New Officers - Assn of Military Surgeons. Washington, D. C., 9 November '61. Major General James P. Cooney MC USA (Ret) was elected President of the Association of Military Surgeons of the United States for 1962 at the Annual Business Meeting of the Association on 8 November, the closing day of its 68th Annual Convention.

General Cooney is Vice President for Medical Affairs for the American Cancer Society in New York. During his military career he served as Deputy Surgeon General of the U.S. Army; Surgeon, U.S. Army, Europe; and Commandant of the Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas. An expert on the radiologic aspects of nuclear energy, General Cooney also served as Medical Advisor to The Surgeon General on Atomic Warfare.

The Association of Military Surgeons, organized in 1891 and incorporated by Act of Congress in 1903, is devoted to the advancement of all phases of

medicine in the Federal Medical Services and represents all their medical and paramedical professions.

The three-day meeting with its theme, "International Medicine - Path to World Progress," brought members, international delegates, and guests up-to-date on current trends in military medicine and related fields. Other new officers elected for 1962 are:

First Vice-President: RADM C.B. Galloway MC USN, Assistant Chief for Research and Military Medical Specialties, Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C.

Second Vice-President: COL R.C. Kimberly MC NG, Maryland, Surgical Staff, Johns Hopkins Hospital, Baltimore, Md.

Third Vice-President: W.S. Middleton, M.D., Medical Director of the Veterans Administration.

Fourth Vice-President: Brigadier General M.S. White USAF MC, Surgeon, Air Training Command, Randolph Air Force Base, Texas.

Fifth Vice-President: Brigadier General F.E. Wilson MC USAR, Executive Vice-President, Joint Blood Council, Inc., Washington, D.C.

Sixth Vice-President: L.L. Terry, M.D., The Surgeon General of the U.S. Public Health Service.

Major General T.J. Hartford MC USA (Ret), former Deputy Surgeon General of the U.S. Army, continues as Executive Director of the Association of Military Surgeons, and COL R.E. Bitner MC USA (Ret) continues as Editor of MILITARY MEDICINE published by the Association.

Marine Corps Celebrates 168th Anniversary. RADM Edward C. Kenney, Surgeon General of the Navy, sent the following letter to General D.M. Shoup, Commandant, U.S. Marine Corps, regarding the 186th anniversary of the Marine Corps on 10 November 1961.

"Dear General Shoup:

On the occasion of the 186th Anniversary of the founding of the U.S. Marine Corps, I take great pleasure in congratulating you and all of the men and women serving under you.

During its long history, the Marine Corps has established a glorious record in protecting our Nation and its interests in every part of the world. It is an honor for those of us in the Medical Department of the Navy to be associated with you.

With warmest personal regards and every good wish for the continued success of your Corps throughout the years ahead, I remain

Sincerely,

/s/

E. C. KENNEY"

Noteworthy Promotions. Dr. Paul W. Greeley, Consulting Plastic Surgeon at the Westside Veterans Administration Hospital in Chicago, was promoted to Rear Admiral in the Medical Corps, U.S. Naval Reserve. ADM Greeley served as Chief of Plastic Surgery at the Oakland Naval Hospital from 1943 to 1946. He is a member of the Board of Consultants to the Surgeon General of the Navy and is Consultant in Plastic Surgery to the Commanding Officer, U.S.N.H., Great Lakes, Ill. Since 1937, he has served as attending plastic surgeon and Chief of Plastic Surgery Service at University of Illinois Hospital and St. Luke's Presbyterian Hospital in Chicago.

Dr. Raymond T. Holden, Clinical Professor of Obstetrics and Gynecology, Georgetown University School of Medicine, was promoted to Rear Admiral in the Medical Corps of the Naval Reserve. ADM Holden entered the Naval Reserve in February 1942 and served on active duty until May 1946. Since 1946, he has served as attending obstetrician and gynecologist at Georgetown University Hospital. He is Consultant in his specialty to the Commanding Officer, U.S. Naval Hospital, National Naval Medical Center, Bethesda, Md.

American Board of Obstetrics and Gynecology - Office of the Secretary

Robert L. Faulkner, M.D., 2105 Adelbert Road
Cleveland 6, Ohio

The Part I Examinations (written) of the American Board of Obstetrics and Gynecology will be held in various cities of the United States, Canada, and military centers outside the Continental United States on Friday, January 5, 1962.

Applicants and candidates for examination in 1963, please note that the deadline date for making application is advanced to July 1, 1962.

Current Bulletins outlining present requirements may be obtained by writing to the Executive Secretary's office.

125th Anniversary. The U.S. Naval Hospital, Chelsea, Mass., oldest naval hospital in continuous service, celetrated its anniversary with appropriate ceremonies, including a large open house and symposium on "New Frontiers in Naval Medicine."

Epidemic in Manila. A five-man cholera treatment demonstration team from the U.S. Naval Medical Research Unit No. 2 on Taiwan, assisted in setting up facilities to treat an epidemic of diarrheal nature in Manila. The epidemic was not one of classical Asiatic cholera, but was due to the "el tor vibrio" which is related to the cholera vibrio. At the suggestion of the World Health Organization and on invitation from the Philippines Government, the NAMRU-2 team demonstrated the latest methods for combating the disease, assisting other medical personnel in the Manila area.

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DENTAL SECTION

The Sealing of Pulpless Teeth Evaluated With Radioisotopes

F. James Marshall, DMD, MS, University of Manitoba, Winnepeg 3, Manitoba, and Maury Massler, DDS, MS, University of Illinois, Chicago, Ill. J Dent Med 16:172-184, October 1961.

Endodontists generally agree that the root canals in pulpless teeth should be permanently and completely obturated. However, the numerous materials and methods used to fill root canals have seldom been tested experimentally. Documented evidence should replace the clinical impressions and the indirect clinical evidence presently used as a basis for selection of endodontic procedures.

The following pertinent questions should be answered: (1) How effective are the fillings used to seal the root canal? Do they really seal against the ingress of small particles and ions as well as against large particles and bacteria? (2) What is the role of the occlusal seal? If this seal is broken (as frequently happens clinically), is the seal of the root canal also altered? And vice versa, if the root canal seal is poor, will a good occlusal seal help to resist periapical fluid invasion into the root canal? (3) Many different types of root canal obturators and filling technics are available and new ones are offered each year as being superior. These offers are made empirically and usually without documentation.

A few attempts have been made to present some method of testing the seal of a root canal filling with dye, bacteria and recently with isotopes.

The radioisotopes offer a delicate and accurate tool for testing the ability of different fillings to seal the canals. This study was designed to use this tool to compare the sealing quality of a number of root canal fillings.

Grossman pioneered constructively when he studied the hermetic seal of temporary occlusal fillings used in endodontics. He found that zinc oxide-eugenol sealed best under the conditions of his test. Massler and Ostrovsky studied a series of filling materials in a manner similar to that used by Grossman. They also found zinc oxide-eugenol paste to be the most effective sealer under the condition of their test.

Dyes and isotopes were used to test the marginal integrity of root canal fillings by Dow and Ingle and by Schroeder. Dow and Ingle tested the effectiveness of cementing media of root canal fillings using radioiodine (I^{131}).

Autograms of the sectioned teeth showed root canal penetration of the isotope in only a poorly obturated specimen.

Schroeder used 210 formalin-fixed teeth and 90 freshly extracted teeth to study the permeability of various root canal filling materials to methylene blue dye. Some of the specimens were centrifuged with a reservoir of dye sealed over the crown. He reported that silver amalgam showed no leakage with or without centrifuging while zinc phosphate leaked with and without centrifuging. A gutta percha point sealed with zinc phosphate cement showed no leakage with or without centrifuging if the gutta percha point was fitted tightly, otherwise it showed leakage. Diaket showed no leakage before centrifuging but leaked with centrifuging. Gutta percha points sealed with chloropercha leaked with and without centrifuging.

The canals were filled with a variety of technics using two different root canal points (gutta percha and silver) and four different sealers. Gutta percha was also packed into the canal in small pieces.

Six radioisotopes were used to test the marginal sealing of these fillings in two ways: (1) from inside the tooth with the tracer solution placed by hypodermic syringe in the unfilled portion of the root canal above the root canal filling and (2) from outside the tooth, with the root of the tooth immersed in the tracer solution. In all cases, the teeth were exposed to the tracer solutions immediately after filling. This did not allow time for the sealer to set.

Autograms were prepared from the hemisections using Minimax extra-fast double emulsion dental x-ray film. Exposure time was determined empirically for each isotope to give the greatest amount of definition.

If the autograms showed no penetration into the margins of the root canal filling, it was recorded as "No Penetration." "Marginal Penetration" was considered to be present when even the smallest amount of penetration occurred between the root canal filling and the dentin wall. Penetration of the isotope beyond the root canal filling and through the root apex was recorded as "Complete Penetration."

The same scheme was used to describe the penetration of the isotope from outside the canal.

Penetration through the apex occurred in all of the specimens filled with a silver point without sealer. Fitted gutta percha points without sealer were only slightly more effective than the silver point without sealer.

The other root canal fillings performed between these two extremes. Gutta percha points with sealer permitted less isotope penetration than silver points with the same sealer.

The use of a sealer greatly improved the efficiency of gutta percha points and silver points as root canal fillings. Gutta percha points alone sealed much better than silver points alone, possibly because of the malleability of the gutta percha. Small pieces of gutta percha were slightly more efficient than a silver point with sealer or a single gutta percha point without sealer, but did not seal as well as had been previously reported. A gutta percha point with sealer, sealed approximately 25 to 50% of the specimens

perfectly, while 50 to 75% showed slight marginal penetration. A gutta percha point without sealer showed complete penetration in 75% of the specimens; the rest showed deep marginal penetration. There were no differences apparent whether the occlusal opening was plugged with cotton or with zinc oxide-eugenol.

This investigation was designed to test the sealing properties of root canal fillings, in vitro.

Since the isotope was placed in the canal or around the apical foramen immediately after the canal was filled, changes in the sealer which occur after setting, such as shrinkage or cracking, were not tested. Our observations were limited to the 24 hour period immediately after the filling was inserted. Nonetheless, a number of clinically valid inferences can be drawn from these tests.

Going found that all coronal restorations permitted some marginal penetration by radioisotopes. Our study shows that it is possible to seal root canals completely by a proper filling.

The most efficient root canal filling tested consists of a fitted gutta percha point and sealer. A silver point without a sealer is the least efficient. A gutta percha point without sealer is only partially effective. Gutta percha in small pieces without sealer, is slightly better. It seems valid to conclude that sealers are essential for effective root canal obturation with the technics employed in this investigation. The sealers tested differed only slightly in efficiency.

The seal of root canal fillings may also be modified by the occlusal seal. In a previous series of tests, it was found that gentian violet penetrated less when the occlusal opening was sealed with zinc oxide-eugenol than when it was simply plugged with cotton. This could explain the absence of clinical symptoms in teeth which radiographically show poor root canal fillings. However, isotopes are much smaller and diffuse much more rapidly than the dye molecules and in this study it was found that the isotope tracers penetrated equally well whether or not an occlusal seal was used. It is apparent that a good root canal filling cannot be improved by a good occlusal seal. However, good occlusal seal is essential during treatment prior to filling, when the apex is open, since otherwise the canal may become filled with periapical exudate.

The skill of the operator is perhaps more important to successful obturation than the materials used. During one phase of the study, a series of teeth were treated and filled by a dental student. The results were remarkable for their extreme variability.

A root canal could be completely sealed 100% of the time against marginal ingress of even a small radioactive ion by the proper use of a well fitted gutta percha point and a proper sealer.

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Personnel and Professional Notes

CDR Courage Presents Essay. Cdr Guy R. Courage DC USN, Head, Exodontia Department, U. S. Naval Dental Clinic, Long Beach, California, presented an essay at the Harbor District Dental Society Meeting held at the Lafayette Hotel, Long Beach on 14 November 1961. The essay presented was Office Oral Surgery Procedures for the General Practitioner.

DR. Murphey and DR. Walker Lecture at NDS. Drs. Phelps J. Murphey and Robert V. Walker of Dallas, Texas, lectured on Surgical Orthodontic Correction of Facial Deformities to staff, resident, and postgraduate Dental officers, and civilian and military guests at the U. S. Naval Dental School, NNMC, Bethesda, Md., Friday 20 October 1961.

Their presentation, utilizing study casts, roentgenograms, motion pictures, and slides, described the use of Cephalometric measurements in identifying pseudo and true macrognathia and micrognathia. They also described a technic for determining the degree of surgical and orthodontic procedures in the correction of certain facial deformities.

Dr. Murphey limits his practice to orthodontics and is a member of the Attending Staff in Orthodontics, Children's Medical Center, Dallas, Texas. He is a life member of the American Society of Dentistry for Children and a member of the American Association for the Advancement of Science. He was formerly the Officer in Charge of the Maxillofacial Prosthetic Department of the U. S. Naval Dental School, and holds the rank of Captain in the Dental Corps, U. S. Navy Reserve.

Dr. Walker is Chairman, Oral Surgery Division, Department of Surgery, Southwestern Medical School, University of Texas. He is also Assistant Professor of Oral Surgery at Baylor University College of Dentistry and is a Consultant in Oral Surgery at the Veterans Administration Hospital, Dallas, Texas. He is a member of the Southwest Society of Oral Surgeons and the American Society of Oral Surgeons. Dr. Walker is a Diplomate of the American Board of Oral Surgery and a Fellow in the American College of Dentists.

DT1 McGuire Develops Supply Level Tables. DT1 James S. McGuire USN, on duty at the U. S. Naval Dental Clinic, Brooklyn, New York, has developed a table which is intended to simplify the method of determining levels of supply. The table is applicable to facilities not operating under Navy Stock Fund accounting procedures.

The table is designed to enable the user to determine the Monthly Usage Rate (MUR), Safety Level (SL), Operating Level (OL), and the Stockage Objective (SO), along with the Reorder Level (RL), and the Requisitioning Objective (RO), when the annual usage rate varies from 1 to 144 items and with an order and shipping time variable of from 1 to 6 weeks. The following examples illustrate the use of the table:

Example -- Assume the past 12 months issue of an item to be 43 units, the order and shipping time (O&ST) to be 5 weeks with no significant increase or

decrease in Dental officers anticipated.

USED	MUR	SL	OL	SO	5WK.	O&ST
					RL	RO
43	3.58	7.16	7.16	14.33	12	19

If a significant increase/decrease in Dental officers is anticipated during the next 3 months, the following formula is applied.

$$\frac{\text{Anticipated Dental Officers Increase/Decrease}}{\text{Average Dental Officers Past 12 months}} \times \frac{\text{Quantity Issued Past 12 Months}}{1} = \text{Anticipated Issues}$$

Example -- Assume the past 12 month issues of an item to be 43 units, the order and shipping time to be 5 weeks, and the number of Dental officers is anticipated to increase from six to eight during the next three months.

$$\frac{8}{6} \times \frac{43}{1} = \frac{344}{6} \text{ or } 57.3 \text{ units to be issued}$$

Utilizing the 57 units as the quantity issued, the following quantities are determined from the Table:

USED	MUR	SL	OL	SO	5WK.	O&ST
					RL	RO
57	4.75	9.50	9.50	19.00	15	25

Copies of the table may be obtained by request from Chief, BUMED, Attn Code 612.

DR. Arnold Lectures at NDS. Dr. Francis A. Arnold, Jr., Director of the National Institute of Dental Research, National Institutes of Health, Bethesda, Md., lectured to staff, resident, and postgraduate Dental officers at the U. S. Naval Dental School, NNMC, Bethesda, Md., on 19 October 1961.

Dr. Arnold spoke on his recent tour of Russia, and described educational institutions and clinical facilities in the Soviet Union. In addition, he outlined some of the types of clinical procedures practiced in Russia and the public health aspects of dental practice.

Dr. Arnold was one of the eight representatives of American dentistry who toured 5 cities in Russia this past June. He has been associated with the National Institutes of Health since 1937, and has been Director of the Dental Institute since 1953, as well as a consultant at the U. S. Naval Dental School.

RADM Riebe Honored. Rear Admiral H. P. Riebe DC USN (Ret.), former Inspector General (Dental) of the Bureau of Medicine and Surgery was

honored recently at the University of California Medical Center's commencement ceremonies held in San Francisco, California. Admiral Riebe, an instructor in the Operative Dentistry Department, School of Dentistry, received the Faculty Award and was named as the Outstanding Instructor for the class of 1961.

Cornerstone Cermony at Submarine Base Dental Facility. Rear Admiral E. G. F. Pollard DC USN, Director of Dental Activities, 5th Naval District, and Force Dental Officer, Commander in Chief, U. S. Atlantic Fleet, represented the Dental Corps of the U. S. Navy at the cornerstone laying ceremony of a new 14 chair dental facility under construction at the U. S. Naval Submarine Base, New London, Connecticut, on 26 October 1961.

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U. S. - U. K. Dentists Attend Navy Conference

By Public Information Office, Commander in Chief, U. S. Naval Forces, Europe.

London (7 Nov. 1961) ..... The U. S. Office of Naval Research, London, introduced films on the latest American technics in dentistry to British dentists, during a recent conference at the American Embassy.

It was the second conference of a quarterly series the Navy has scheduled to disseminate and exchange information on recent developments in dentistry. Capt Eugene A. Walsh, USN(DC), Dental Liaison Officer for the Navy's research branch in London, is coordinator.

This second conference was in honor of RAdm Clifford C. DeFord, USN(DC), Inspector General of the U. S. Navy Dental Dept., who was visiting London.

Films from the American Dental Association and the Office of Naval Research were shown, and discussions followed.

Also attending were Admiral DeFord's counterparts in the Royal Air Force, Army, and Navy, plus many high-ranking British dental authorities.

Capt Walsh and his staff give lectures and show films concerning American dental techniques to dental societies and colleges throughout England.

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CAPT Demer Appears Before Study Club. Capt W. J. Demer DC USN, Diplomate, American Board of Prosthodontics, on duty at the U. S. Naval Weapons Plant, Washington, D. C., recently presented a paper entitled The Mechanics of Retention in Removable Partial Dentures, to members of the Georgetown Study Club, composed of Alumni of Georgetown University Dental School.

PREVENTIVE MEDICINE

Shipboard Tuberculosis Among Naval Personnel

LCdr Charles H. Miller MC USN, Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.
Presented to Association of Military Surgeons of the United States, November 1961.

This report on investigations of shipboard tuberculosis among naval personnel is based on information contained in epidemiologic reports submitted to the Bureau of Medicine and Surgery by Naval Medical officers and personnel of Navy Preventive Medicine Units who conducted the investigations.

The first case of tuberculosis was detected aboard Destroyer I in March, 1959, and the study was terminated in December 1960.

In July, 1959, epidemiologic investigations were initiated aboard Destroyer II, following notification of admission of a patient, recently detached from the ship, with moderately advanced tuberculosis. The outbreak was declared terminated in March, 1960.

Destroyer I

During the epidemic period, Destroyer I was operating in widely separated areas of the world.

On 13 March 1959, annual photofluorographic studies were performed on all personnel aboard. These studies revealed 1 case of minimal pulmonary tuberculosis.

In early June 1959, the 2nd case was discovered. A 23 year old petty officer complained of a cough of 2-weeks duration, and although this patient had a normal 70 mm photofluorogram two months earlier, a 14- X 17-inch chest x-ray revealed lesions compatible with minimal tuberculosis.

These first two patients suffering from active tuberculosis were assigned to the same "R" Division and slept in nearly adjacent bunks. Consequently, the 30 men assigned to this division were studied by means of tuberculin tests and chest roentgenograms. Four of the 30 men manifested a positive tuberculin test, but there was no evidence of disease.

In January 1960, 6 months later, the 3rd case was discovered. This patient also had been in the same division as the first two cases and had been

one of the 4 PPD reactors noted in June 1959. This individual admitted to a 4-month history of a cough and several episodes of hemoptysis.

In mid-February the 237 personnel aboard the destroyer were subjected to tuberculin testing, and a few days later were examined by 70 mm chest photofluorography. No disease was reported, but 61 (or 26%) of the personnel were found to have positive tuberculin reactions. Of the 28 remaining men assigned to the "R" Division, from which 3 cases of active tuberculosis had been removed, 14 were reactors. Of these 14 reactors, 11 had converted since the previous test, approximately 7 months earlier.

In May 1960, the 4th and final case of active disease was detected. This individual also was from the same "R" Division as the 3 previous cases. In February 1960, this individual had a negative chest x-ray, and between June 1959 and February 1960, he had converted to tuberculin positive.

Following the 4th case, Preventive Medicine Unit No. 2, at Norfolk, Va., was requested to provide assistance to Destroyer I. Personnel from the Preventive Medicine Unit No. 2 analyzed known information and made specific recommendations regarding further case-finding studies, outlined a health education program for use by the Medical Department Representative, and suggested procedures to decontaminate living and working compartments within the ship. A decision to hospitalize all personnel subsequently found to convert from tuberculin negative to tuberculin positive was agreed upon.

In mid-May a second survey was performed. Using the same dosage of PPD, all previously negative tuberculin reactors were given tuberculin tests, and chest x-rays were obtained on everyone on board. As a result of these studies, 19 men were hospitalized. Of the 19 hospitalized in May, 3 had suspicious findings noted on chest roentgenograms, but 16 were admitted on the basis of skin-test conversion only. None of these 19 personnel had symptoms suggesting pulmonary disease. Three of the 16 converters were from the hard-hit "R" Division; 8 were from a different single Division "M"; the remaining 5 converters were distributed throughout the destroyer.

In July, 3 months later, a third case-finding survey was conducted. Seven asymptomatic tuberculin converters were hospitalized for studies. The "R" Division contributed 2 of these last 7 converters, and the "M" Division yielded 4. Roentgenograms on previously known tuberculin positive individuals remaining on board revealed no evidence of active disease.

In late October 1960, all remaining tuberculin negative individuals aboard the destroyer again were tested with 0.0001 mg PPD. No additional tuberculin converters were discovered.

In December, all tuberculin positive individuals were examined roentgenographically, and no evidence of disease was detected. No additional special studies have been conducted and none are contemplated.

The personnel admitted to Naval Hospitals, on the basis of tuberculin conversion only, were subjected to thorough diagnostic studies, and no evidence of active disease was detected. These individuals appeared before a Medical Board which recommended return to full duty. Each individual is to have periodic examinations, including 14- X 17-inch chest roentgenograms,

for 3 years. The Board also recommended that these personnel receive a daily dose of 300 mg Isoniazid for one year.

Destroyer II

The second destroyer presented a slightly different picture. In July 1959, the first case of active tuberculosis was discovered in a 22 year old caucasian. While on leave, after being detached from the destroyer and enroute to his next duty station, this individual was admitted to the hospital and was found to have moderately advanced active pulmonary tuberculosis. In January 1959, 6 months prior to admission, a chest roentgenogram had been performed on him and had been reported as negative. Whether this was a 70 mm photofluorogram or a standard 14- X 17-inch roentgenogram is not known. Upon admission, he stated that for approximately one year he had noted an increase in fatigue; in the preceding 6 months he had experienced a slight anorexia; and for the previous 2 months he had suffered a non-productive cough. An examination of the sputum revealed acid-fast bacilli, and the hospital entrance chest x-ray revealed a 2.5 cm cavity in the right apex.

The Commanding Officer of Destroyer II was notified that this sailor, recently released from his command, was in the hospital with tuberculosis. In March 1959, annual photofluorograms had been taken of the entire crew of the destroyer and no tuberculosis was reported from these x-ray examinations. It is not known whether the first case was included in this survey.

On 17 July 1959, the entire crew was again examined by 70 mm photofluorograms. One additional case of far advanced pulmonary tuberculosis was admitted as a result of these examinations. In March 1959, this individual had been examined by a 70 mm chest x-ray which had been reported as "negative."

In mid-August, a 3rd case, whose July 70 mm roentgenogram had been reported as normal, was admitted. The hospital entrance x-ray revealed a left pleural effusion, occupying 60% of the left hemithorax. Gastric cultures were performed and mycobacterium tuberculosis was recovered.

On 24 August, the 4th case was admitted. The 70 mm photofluorogram taken in July had revealed a suspicious infiltrate which a 14- X 17-inch x-ray had confirmed. A tuberculin test had been performed and apparently interpreted as negative, and this man had been retained on duty aboard the destroyer. On 22 August a repeat tuberculin test revealed 4 cm of infiltration. This man immediately was admitted to the hospital for further studies. Sputum and gastric examinations were negative, but bronchial washings were cultured and mycobacterium tuberculosis was recovered from the specimen.

As a result of 4 admissions for tuberculosis, the Commanding Officer of the destroyer requested epidemiologic assistance. Preventive Medicine Unit No. 5, San Diego, California, conducted an investigation and made recommendations regarding shipboard sanitation precautions, presented a health education program to the officers and enlisted personnel aboard, and arranged for Lt Jess W. Bromley MC USN, from the U. S. Naval Hospital,

Oakland, California, to carry out recurring medical investigations.

On 9 September, intermediate strength skin tests, using 0.0001 mg Purified Protein Derivative (PPD), were performed on all personnel aboard the destroyer and were scheduled to be repeated in December.

A total of 90 (65.6%) of the 162 personnel aboard the destroyer converted from tuberculin negative to tuberculin positive. It was known that 23 of these individuals converted between September and December. The remaining 67 were found to be tuberculin positive during the September survey. However, the health record of each of these 67 men contained an entry of a previous negative tuberculin skin test. The dates of these previous tests are unknown.

During the remainder of the epidemic period, ending in February 1960, 7 additional young men were hospitalized because of tuberculin conversion detected during surveys. In 6 of these men a diagnosis of minimal pulmonary tuberculosis was made. None of the 6 had radiographic evidence of disease, but cultures of sputum, gastric contents, or bronchial washings obtained following tuberculin conversion were positive.

A final report has not been received regarding the outcome of the diagnostic studies made on the 7th man who had been found to have a recent infiltrate in right upper lobe.

Based upon the results of this study, Dr. Bromley concluded that the tuberculin skin test was more sensitive than x-ray examination in detecting incipient tuberculosis.

Summary

The incidence of tuberculosis aboard two destroyers operating independently of each other in different fleets was exceedingly high in 1959-1960. The two destroyers had a combined strength of 410 individuals throughout the epidemic period. During this time 41 persons (or 10% of the complement of these destroyers were admitted to the sick list. Twenty-three of these admissions were made for diagnostic studies as a result of tuberculin conversion only, and 3 admissions were made because of suspicious shadows noted on 70 mm photofluorograms. No active disease was detected in any of these 26 men, and they were ultimately returned to duty. The identity of those returned to duty is known to the tuberculosis case registry in the Bureau of Medicine and Surgery. It has been recommended that all these individuals remain under close medical surveillance for indications of active disease for a period of 3 years, and receive 300 mg Isoniazid daily for one year. Of the remaining 15 admissions, 14 men were found to have active disease, and the status of one is as yet unknown. Six of the 14 with active tuberculosis had no radiographic evidence of the disease, but as a result of diagnostic studies initiated because of tuberculin conversions, bacteriologic evidence of tuberculosis had been obtained.

Conclusions:

Recent experience has demonstrated the communicability of tuberculosis in the limited space in which personnel aboard ship must live. The tuberculin

skin test as a case-finding mechanism among young adult males was found to be equal, if not superior, to x-ray.

It was administratively decided that selected tuberculin converters, with no evidence of disease, could resume full duty if under close medical supervision, including Prophylactic Isoniazid for one year and frequent clinical evaluation for 3 years.

Addendum:

Subsequent to the shipboard outbreaks just described, the Surgeon General of the Navy requested the National Research Council of the National Academy of Sciences to consider certain aspects of the Navy's Tuberculosis Control Program. The Ad Hoc Committee on Tuberculosis of the National Research Council recommended that the Navy place increased emphasis on the use of the tuberculin skin test, and further, urged that tuberculin converters be given Isoniazid Prophylaxis and kept under close medical surveillance for a full year following conversion.

These recommendations have been considered in revision of the Navy's Tuberculosis Control Program.

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The Role of Mosquitoes in Transmission of Human Disease

Bayard F. Bjornson, Assistant Chief, Insect and Rodent Control Training, Communicable Disease Center, PHS DHEW, Atlanta, Ga. Pest Control 29:19-32, April 1961.

Malaria. Malaria is an acute or chronic disease caused by tiny protozoan parasites of the genus Plasmodium, which are transmitted from man to man by Anopheles mosquitoes. Only 2 species of Anopheles appear to be important in the transmission of the disease in the United States, A. quadrimaculatus east of the Rockies, and A. freeborni west of the Rockies.

Malaria is prevalent between latitude 45° N. and 40° S. around the world and is responsible for more deaths per year than any other arthropod-transmitted disease.

The number of malaria cases has declined by tens of millions in the past few years under the impact of modern residual insecticides applied on a nation-wide scale in many countries. For example, in Ceylon, morbidity rates have fallen from a 1940 level of 574 per 1,000 population to a low of 0.35 per 1,000 in 1956. Malaria has been similarly reduced in the Western Hemisphere, and in many other countries such as Italy, India, and the Philippines. In 1959 in the United States, only a single case of malaria was contracted by a person who probably had not been outside the country.

Yellow Fever. Yellow fever is a virus disease with two distinct epidemiologic types: urban and jungle. Both are caused by the same virus, and people may

be protected from both types by the same vaccine, but the insect vectors and vertebrate hosts are quite different. Classical urban yellow fever, transmitted by Aedes aegypti, with the cycle (man-yellow fever mosquito-man) has largely disappeared. Jungle yellow fever, on the other hand, with a normal cycle of monkey-to wild mosquitoes (Haemagogus, Sabethes, etc.)-to monkey, is endemic in South America. Man gets the disease by accident when bitten by these wild mosquitoes in their natural habitat, the jungle. Beginning in 1948 a wave of jungle yellow fever began sweeping north from Panama through Central America reaching Costa Rica (1951), Nicaragua (1952), Honduras (1953), Guatemala (1955), and Trinidad (1954-59). This has led to increased surveillance and quarantine measures, particularly at international airports. Aedes aegypti are still found in many areas of the Southeastern United States, though they have apparently disappeared from some cities. However, there is a continuing need for yellow fever vaccinations of persons who travel into yellow fever areas; for medical examinations of persons and monkeys coming from these areas; for disinsection of aircrafts and ships; and for entomologic surveillance of airports and dock areas.

Dengue. Dengue, also called "breakbone fever," is an acute, rarely fatal disease caused by a virus. It is characterized by sudden onset, high fever, severe headache, backache, and joint pain, and a rash appearing on the third or fourth day, particularly on the hands and feet. Its mortality rate is very low.

Dengue is transmitted from person to person by Aedes aegypti, the yellow fever mosquito. The cycle is similar to that in yellow fever. It may occur in explosive epidemic form in almost any part of the subtropics. It has been prevalent in the Mediterranean, Africa, South America, Southeast Asia, and the Pacific Islands.

Filariasis. Human cases of filariasis are caused by 2 nematode worms, Wuchereria bancrofti and malayi, hence the names Bancroftian or Malayan filariasis. The adult worms live in various parts of the lymphatic system. Young filarial worms are transmitted from person to person by various species of mosquitoes including Culex pipiens-quinquefasciatus complex, Aedes polynesiensis and Anopheles gambiae, and certain species of Mansonia. Symptoms range from inapparent infections to inflammation and other complications. In some people who have prolonged and repeated infections, there may be extreme enlargement of parts of the body, often with thickened and rough skin called elephantiasis. It is widely distributed in tropical and subtropical regions, and is found in the West Indies, Colombia, Venezuela, Panama, and coastal portions of the Guianas and Brazil in the Western Hemisphere. This disease is not now known to be naturally acquired in the United States.

Encephalitis. Several virus diseases which affect the central nervous system of man and cause encephalitis, an inflammation of the brain, are transmitted by mosquitoes. In the United States, Eastern Encephalitis, Western Encephalitis,

and St. Louis Encephalitis are the most important of these viruses. The first 2 occur in horses and mules as well as man, but the St. Louis type affects man without noticeable effect on horses.

Present knowledge indicates that birds serve as natural hosts and reservoirs, mosquitoes as principal vectors of the encephalitides, and that the only way man becomes infected is by the bite of an infected mosquito. Human cases vary from mild, inapparent infections to very severe illnesses with permanent damage to the brain and other parts of the nervous system or even death. Identical symptoms occur in horses. Symptoms of severe infections include abrupt onset, high fever, severe headache, stiff neck, irritability, drowsiness and coma, muscular twitching and convulsions. These symptoms are sometimes mistaken for poliomyelitis. Residual paralysis is not common in encephalitis.

These mosquito-borne viral encephalitides are the most important vector-borne diseases in the United States today.

Eastern Encephalitis. This disease is found along the Atlantic and Gulf Coasts and in limited areas of the Mississippi Valley associated with fresh water swamps. Eastern Encephalitis occurs in horses and pheasants very commonly. Domestic fowl are not considered important reservoirs of this disease. The mortality rate is high, averaging 60% in humans and 90% in horses.

Culiseta melanura, the bog mosquito, is considered the primary vector for maintaining the disease cycle in nature (bird-mosquito-bird), but has not proved responsible for human and horse outbreaks. Other genera of mosquitoes such as Aedes, Mansonia, and Psorophora are suspected vectors. This virus has been isolated from over 20 species of birds. Likely vectors in horse cases would include both A. sollicitans and A. vexans. C. melanura is not reported to have bitten man or horses in limited surveys.

Western Encephalitis. Western Encephalitis is found in horses and man in all states west of the Mississippi and in Illinois and Wisconsin. It is found in birds and mosquitoes in limited areas in the East. The mortality rate ranges from 5% to 15% in man and 20% to 30% in horses.

Culex tarsalis is considered the primary vector of Western Encephalitis. It breeds in great numbers in overflow or seepage from irrigation and in grassland surface pools. Abundance of C. tarsalis early in the season and excess precipitation appear to favor outbreaks of this disease.

St. Louis Encephalitis. In general, St. Louis Encephalitis has been found in the Western and Central States, and was recently isolated for the first time in Florida. Outbreaks appear to be of 2 types, rural and urban. In rural outbreaks, St. Louis and Western Encephalitis are frequently mixed. Mortality generally ranges from 2% to 11%. Wild and domestic birds are commonly infected with this virus.

Culex tarsalis is the principal vector of rural St. Louis Encephalitis in the West. Culex pipiens-quinquefasciatus complex is the primary carrier of the urban form in the Central States. The virus has been isolated from C. tarsalis several hundred times.

C. pipiens-quinquefasciatus mosquitoes breed in polluted water contaminated by industrial wastes, street catch basins, etc. Epidemics often occur following droughts. Low rainfall apparently favors the production of Culex pipiens, which occurs in sewage water or other man-made breeding places. This virus was isolated from the blood of a wild bird (flicker) and one pool of Culex pipiens mosquitoes collected from a chicken house.

The 2 preventive measures currently practiced against encephalitis are immunization of horses, and mosquito control.

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Storage, Handling, and Tagging Cylinders

During the past 10 months the U. S. Navy Inspector General, Medical, has found many violations of paragraph 4a of BUMEDINST 5100. 1B and paragraph 3332 of NAVMED P-5040. BUMEDINST 5100. 1B and DODINST 6040. 30 of 15 Oct 1956 directed that all oxygen cylinders be tagged with DD Form 1191 and the precautionary measures listed thereon be carefully followed.

It is strongly recommended that specific responsibility for storage and handling of oxygen cylinders be assigned and that each cylinder be tagged by the same individual upon receipt.

The following is quoted from SECNAVNOTICE 5100 of 25 Aug 1961, paragraph (3):

> Action. The policy established in enclosure (1), Safety Policy for the Federal Service, shall be energetically pursued through a continuing effort to promote safety in industrial operations, aboard ships, in the home, on the highway and in recreational activities. To this end all echelons of command in the Department of the Navy are charged to:
>
> (a) Reexamine existing safety programs under their direction with a view to strengthening and expanding such programs wherever necessary in order to achieve the necessary conservation of our resources.

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Salmonella Infantis Food Poisoning
Military Installation

Reported by Preventive Medicine Unit No. 2, Norfolk, Va. DHEW PHS Morbidity and Mortality Vol. 10, No. 41, 20 October 1961.

On 17 and 18 July, an outbreak of 65 cases of gastroenteritis occurred aboard a Navy vessel. Prompt intensive investigation revealed the probable vehicle to be roast turkey and the causative organism, Salmonella infantis. The majority of those ill complained of diarrhea, cramps and anorexia; between 30% and

45% complained of headache, chills and fever, nausea and myalgia. Several were admitted to sick bay because of the severity of the symptoms.

Upon questioning, it was found that all of those ill were in the duty section on Sunday, 16 July, and had eaten in General Mess. No selectivity by age, race, service rate or berthing area was apparent. Preliminary survey indicated the suspect meal to have been that served in the late afternoon. The average incubation period was slightly over 15 hours; 80% of the cases fell in the range of 10 to 24 hours.

The late afternoon meal had been served to 225 men and consisted of the following: roast turkey and dressing, potatoes, giblet gravy, cranberry sauce, peas, asparagus, lettuce-tomato salad with French dressing, bread, rolls, butter, milk and strawberry shortcake with whipped cream.

All of the 65 ill and 53 of those who remained asymptomatic were questioned regarding foods eaten and not eaten. Turkey appeared to be the most probable vehicle.

The turkeys, supplied frozen by a North Carolina packer, were delivered to the installation on 2 May. The boxes were unrefrigerated for 30 minutes before loading into the freezers. They remained in the freezers until 15 July when 16 turkeys were removed at 4:00 p. m. to a nonrefrigerated space for thawing. The 16 birds, ranging from 20 to 25 lbs. in weight, remained in the nonrefrigerated space until 7:00 a. m. on 16 July when they were put into the oven. However, the cook noticed that the insides of the turkeys were still frozen solid when they were placed in the oven. The birds were cooked from 7:00 a. m. until 1:00 p. m. at 300° F, removed from the oven to cool, and sliced at 2:00 p. m. The sliced turkey was then put directly on the line for serving. The cook stated the birds "looked good and tasted good."

Attack Rates for Selected Foods
According to History of Consumption

Food	Total Eating	No. Ill	% Ill	Total Not Eating	No. Ill	% Ill
Turkey	117	67	57	3	0	0
Dressing	53	30	57	67	36	54
Gravy	71	39	55	49	28	57
Fr. Dressing	22	12	55	99	53	54
Cake	80	47	59	40	19	48

No food remained from the suspect meal for laboratory study. However, rectal swabs were obtained from the 120 individuals interviewed. From 57, salmonella organisms of the C_1 group were obtained. All were serotyped as Salmonella infantis. Analysis of the results by those ill and not ill is presented:

	Number Cultured	Positive for S. infantis	Percent Positive
Ill	65	38	58
Not Ill	55	19	35
Total	120	57	48

In summary, the most likely mode of transmission would appear to have been via the visceral cavity and adjoining meat of the turkeys which were still frozen when placed in the oven and not cooked to a sufficient degree to kill the indigenous salmonella organisms.

* * * * * *

RESERVE SECTION

USNR Retirement Worries? Check Over These Points

Are you one of the many Reservists who will complete 20 years of satisfactory federal service for retirement purposes in the next few months? Or perhaps you have already completed your "20" and are puzzled over the alternatives you face if you have not yet reached age 60.

Here is a roundup of the latest policies and procedures on Naval Reserve retirement. You should find the answers to most of your questions in the following paragraphs.

Although other legislation has touched upon retirement procedures, the principal authority for nondisability retirement is still Title 10, U. S. Code, sections 6017 and 1331 (formerly Title III, Public Law 810, 80th Congress, as amended). Under this law, you—as a Naval Reservist—may retire with pay when you reach age 60—provided you have completed a minimum of 20 years of "satisfactory federal service" and meet certain other requirements.

How to Determine Eligibility

If you have completed 20 years of "satisfactory federal service" (as defined elsewhere in this article), as a commissioned officer, warrant officer, flight officer, aviation cadet, or enlisted member in any branch of the Armed Forces or their Reserve components, you are eligible—upon application—to receive

retirement pay upon or after reaching age 60, subject to the following requirements:

Your last eight years of qualifying service must have been served as a member of a Reserve component. These eight years do not have to be continuous, however.

You must not be eligible for—or receiving—any other retirement pay for military service.

If you were a member of a Reserve component before 16 August 1945, you must have served on active duty during a portion of one of the following periods: 6 April 1917 to 11 November 1918, 9 September 1940 to 31 December 1946, or 27 June 1950 to 27 July 1953.

Any Reservist who meets the age and service requirements is eligible. Any former member who met the service requirements before separation from the service under honorable conditions is eligible to apply for retired pay upon reaching age 60. You should submit your application approximately 3 to 6 months before you become eligible to retire.

What Service is Creditable?

Service in any component of the Armed Forces (including Aviation Cadet service performed after 15 April 1935) is creditable except the following:

Inactive Reserve Section of the Officers Reserve Corps.

Inactive and/or nonfederally recognized status of the National Guard and Air National Guard.

Inactive Officers Section of the Air Force Reserve.

Honorary Retired List after 1 July 1949 or Retired Reserve, unless this service was on active duty.

Service in the Public Health Service or temporary Coast Guard.

Naval Militia service is creditable only between 16 February 1914 and 1 July 1918. National Guard service is creditable after 21 January 1903.

Service as a midshipman or cadet under appointment made on or before 4 March 1913 is creditable for retired pay purposes but is not creditable in establishing eligibility for retirement.

Time on the Inactive Status List (ISL) does not count for retirement purposes but is creditable in determining rate of basic pay.

All service performed before 30 June 1949—with the exceptions noted above—is creditable for Reserve retirement with pay. On and after 1 July 1949, Reservists must earn 50 retirement points each "anniversary year" in order to have that year count as a year of "satisfactory federal service" for retirement purposes.

How You May Earn Retirement Points

Retirement points are credited to Reservists as follows:

One point for each day of active duty or active duty for training (ACDUTRA), including travel time.

One point for each authorized drill attended in either pay or nonpay status.

One point for each period of equivalent instruction or appropriate duty performed as authorized by your commandant or the Chief of Naval Personnel.

Points are credited upon satisfactory completion of authorized correspondence courses. The point credit varies in accordance with the course completed. For officers, these retirement points are credited as follows:

For courses evaluated at more than 12 retirement points, credit will be granted on satisfactory completion of (1) each 12-point unit of the course and (2) the final unit, which may be less than 12 points. Credit applies as of the date the last satisfactory assignment of each unit is mailed. Thus, with a 15-assignment course evaluated at 30 points (2 points per assignment) credit would be granted on satisfactory completion of (1) the first 6 assignments, (2) the second 6 assignments and (3) the last 3 assignments. Where the evaluation of each assignment does not permit dividing a course into 12-point units, the course will be divided into units greater than 12 points, but as close as possible to 12. For example, a course evaluated at 9 points per assignment will be divided into 18-point units. (Officers will not receive retirement credit for completion of Enlisted Correspondence Courses).

For enlisted Reservists completing either Officer or Enlisted Correspondence courses, credit will be granted only upon satisfactory completion of the entire course. The points for each course will be credited to the Reservist as of the date the assignment is completed, but only after satisfactory completion of the entire course. The date an assignment is considered completed is the date on which the assignment is mailed by the enrollee.

Retirement credit will not be given for completion of correspondence courses while on active duty or training duty, or as part of an authorized drill or NROS class.

Gratuitous Points—15 points are credited for each year of membership in a Reserve component, except when on the Inactive Status List or in the Retired Reserve. Gratuitous points are no longer prorated according to the amount of active duty or ACDUTRA performed. However, 15 gratuitous points are not creditable if a Reservist is on full-time active duty for an entire year.

A maximum of 60 retirement points each year may be credited by means of all but the first of the foregoing items. Points for active duty and active duty for training may be added to this 60-point maximum.

Satisfactory Federal Service Defined

Effective 1 July 1949, a year of satisfactory federal service is earned by accumulating a minimum of 50 retirement points during an anniversary year. Before this date, a satisfactory year—or portion thereof—was awarded for each year or portion of a year served in the Armed Forces, including the Reserve components, whether on active or inactive duty. Therefore, if you enlisted in the Naval Reserve on 3 April 1942, and maintained your membership continuously, you would be credited with 7 years, 2 months, and 28 days

of satisfactory federal service as of 30 June 1949. Thereafter, you would have to earn 50 retirement points each anniversary year until you complete 20 years of satisfactory federal service.

What is an Anniversary Year?

The anniversary year for Naval Reservists who were members on 30 June 1949 runs from 1 July to 30 June; for those members entering after 30 June 1949—or whose Reserve service was broken after that date—the anniversary year extends from the date of entry or reentry.

An entry is considered to be the first appointment or enlistment of a member in the Naval Reserve. In the situation of a Regular Navy officer resigning from the Navy and accepting an appointment in the Naval Reserve, his anniversary date will be the date on which he accepts his USNR appointment.

A reentry takes place when the member has resigned or been discharged from the Naval Reserve and was not immediately reappointed or reenlisted, or when his Reserve service has been broken by service in a Regular component. (continued in next issue)

(Taken from The Naval Reservist, November, 1961)

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